IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	: 10/051,459	Confirmation No.	: 6980
First Named Inventor	: Hans BEER		
Filed	: January 22, 2002		
TC/A.U.	: 1797		
Examiner	: Lyle Alexander		
Docket No.	: 103655.50685US		
Customer No.	: 23911		
Title	: Surface-Enhanced Membrane and Process and Apparatus for Producing Same		

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

On August 28, 2008, the Appellant appealed to the Board of Patent Appeals from the final rejection of pending claims 1-2 and 15-17. The following is Appellant's Appeal Brief submitted pursuant to 37 C.F.R. § 41.37.

The response due date, extended two months and to the first business day following a weekend, is December 29, 2008.

The Director is authorized to credit any overpayments or charge any deficiencies to Deposit Account No. 05-1323 (Docket No. 103655.50685US).

(i) Real Party In Interest

This application is assigned to Sartorius Biotech GmbH, Goettingen, Germany, the real party in interest in this appeal.

(ii) Related Appeals and Interferences

Appellant and counsel are not aware of any related appeals or interferences which would affect, be affected by, or have a bearing on this appeal.

(iii) Status of Claims

Claims 1-2 and 15-17 stand rejected and are on appeal, while claims 18-49 stand withdrawn pursuant to Election/Restriction Requirement. Claims 1-2 and 15-17 have been rejected at least twice and are presently the subject of a final rejection.

(iv) Status of Amendments

There are no unentered amendments.

(v) Summary of Claimed Subject Matter

Claims 1-2 and 15-17 include one independent claim. Independent claim 1 is directed to a process for producing a membrane in a manner which is a fundamental reversal of the prior art approach to membrane formation. Dependent claims 2 and 15-17 recite additional features of the invention recited in claim 1. The claims rise and fall together.

A concise explanation of the subject matter defined in independent claim 1, with reference to the Specification by page and line number and to the drawings by reference characters, follows below. As part of this explanation, a

brief description of the prior art is required in order to place the fundamentally different approach of the present invention into context.

The Prior Art: Membranes composed of cellulose are frequently employed in the manufacture of test strips that are used in analyses and in medical diagnostics. The use of membranes containing primarily cellulose nitrate as the dry reaction phase has been necessary for diagnostic tests employed to identify specific analytes,[1] because only this type of membrane can satisfy both the requirement to bind proteins or protein-like substances used as analytes, and the requirement to have large pore sizes. Such membranes are chiefly produced from critical casting solutions in an evaporation process. In this process, the underlying formation mechanism is based on a phase inversion. Original Specification at 1:7-21.

The evaporation process permits the manufacture of microfiltration membranes comprising primarily cellulose nitrate and having pore widths ranging between approximately 0.01 μm and at least 12 μm. One disadvantage with this process is that beyond a pore width of approx. 0.45 μm (membranes normally used in diagnostic applications exhibit pore widths >0.45 μm), a distinct tendency to form "filter dust" has been observed, resulting from unwanted fractionated precipitation of the polymers during the phase inversion process. *Id.* at 1: 22-29. The filter dust fraction results from the fact that the commercially available feedstocks contain a non-membrane-forming, low

[1] For example, in human, animal and vegetable organisms, and in food and the environment.

molecular fraction. This low molecular fraction precipitates out chiefly in the form of a loosely packed layer of dust or irregularly formed deposits on the surface of the membrane. *Id.* at 2:1-6.

Filter dust deposits pose a major problem with respect to membranes used in quick diagnostic tests. Due to differences in structure between the membrane layer and the filter dust deposit, test liquids that are poured onto the membrane will migrate at different velocities, resulting in formation of two separate traveling fronts over a broad, diffuse zone, distorting the shape of the test lines and weakening the intensity of the resulting color signals. These problems create substantial doubt as to the crucial precision and validity of the test results, greatly decreasing image sharpness, sensitivity, reproducibility and clarity. *Id.* at 2:13-26.

In the prior art, the primary approach to reducing filter dust – an approach which is fundamentally changed in the present invention – involves costly, time consuming processing of the commercial feedstock materials to remove the low molecular fraction material from the feedstock *before* the feedstock materials are used in membrane production. *Id.* at 2:27-32. The present invention eliminates the need for such expensive, complicated multi-phase reprecipitating processes to remove the low molecular components from the commercially available feedstocks.

The Present Invention. The inventor, Dr. Hans Beer, went against the conventional wisdom in the art, determining that acceptable (indeed, superior, well-homogenized) membranes could be formed from *unpurified* commercial feedstock materials, with careful *post-formation* filter dust removal *during a critical period after membrane was formed but before it completely dried.* This was directly contrary to the conventional view in the art, which held there was no choice but to purify the commercial feedstock materials prior to forming membranes, primarily because once formed, the very delicate membranes could not withstand physical filter dust removal efforts.

Dr. Beer determined that during critical post-formation period when the delicate freshly-formed membranes were still wet, the membranes were actually sufficiently resilient to withstand gentle fluid rinsing and/or gentle mechanical brushing to remove the filter dust. This determination resulted from Dr. Beer's unexpected discovery that during the period between initial formation of the membrane and its dry state, *i.e.*, while still wet, the filter dust had not yet reached the point of becoming tightly adherent to the surface of the membrane, and therefore could be removed with care.

Consistent with the foregoing, independent claim 1 reads as follows:

> 1. A process for producing a no-through-flow diagnostic cellulose membrane having a refined surface, comprising the steps of:
>
> (a) preparing a feedstock membrane from a cellulose membrane casting solution by phase inversion in an evaporation process, and
>
> (b) prior to drying the resulting feedstock membrane, removing filter dust impurities by mechanical brushing while rinsing with water from at least one side of said partially-dried feedstock membrane from which the solvent is evaporated in the evaporation process of step (a).

Dr. Beer supported the foregoing both in the original disclosure, and in declarations submitted in response to issues raised by the Examiner.

Dr. Beer's first declaration was filed in the response to the Examiner's assertion in the November 10, 2005 Office Action that the claimed membrane formation process would have been obvious because removing a contaminant from a partially-dried membrane (a step in the present invention) would have provided the same result as the prior art processes (citing to the low-filter dust membrane of Dr. Beer's own prior process for membrane formation from purified feedstocks). In Dr. Beer's February 2, 2006 Declaration (attached hereto as Exhibit 1), he: (i) established his experience and expertise in the field: 34 years of experience (as of 2006), a doctorate degree, and Senior Scientist in the Sartorious AG membrane technology R&D department (February 2, 2006 Declaration ¶ 2); (ii) described the present invention and how it differed from the prior art (*id.* ¶¶ 3-5); (iii) stated the Examiner's position (*id.* ¶ 6); and (iv) rebutted the Examiner's assertions, establishing based on his extensive experience and years of first-hand involvement in membrane development that his new fundamentally-different approach to membrane formation was not "mere optimization" of a variable in the process as the Examiner maintained (*id.* ¶¶ 7-9), that those of skill in the art both did not believe the present invention's approach to be viable (*id.* ¶ 10), and that given the great incentives to find an improvement over the prior art pre-use feedstock purification approach, the lack of development in the present invention's direction was evidence that the asserted "mere rearrangement" of filter cleaning steps was not an obvious variation on the prior art process (*id.* ¶ 11).

Dr. Beer submitted a further Declaration dated September 11, 2006 (attached hereto as Exhibit 2), following the Examiner's request in the April 28, 2006 Office Action for further information showing actual data reflecting unexpected results. In response, Dr. Beer provided test results comparing the results obtained by the prior art membrane formation process and that of the present invention (September 11, 2006 Declaration ¶ 5), as well as a detailed description of the processes by which the membranes were formed (*id.* ¶¶ 5-9).

The Pending Claims. The context of the foregoing, the following identifies references to the Specification by page and line number and to the drawings by reference characters supporting the pending claims.

Independent Claim 1: Claim 1 is directed to a process for producing a no-through-flow diagnostic cellulose membrane having a refined surface (Specification at 3:5-6), in which (a) a feedstock membrane is prepared from a cellulose membrane casting solution by phase inversion in an evaporation process, and (b) prior to drying the resulting feedstock membrane, filter dust impurities are removed by mechanical brushing while rinsing with water from at least one side of said partially-dried feedstock membrane from which the solvent is evaporated in the evaporation process of step (a) (*id.* at 3:7-14; 4:1-5; 5:18-20 (mechanical brushing/wiping); 10:31-11:10 (process operation example)). *See also*, Fig. 3 and Specification at 9:19-10:18, illustrating and describing an example membrane formation apparatus, with a membrane drawing machine 7 which issues an initially-formed membrane 6 on a supporting film 19, followed by passage of the newly-formed membrane through a filter dust removal apparatus ("membrane cleansing device 1"). In the cleansing device 1, the

newly-formed membrane 6 is passed through a first rinsing device 2, by a rotating brush serving as a mechanical wiper 3 and through a second rinsing device 4 on its way to a membrane dryer 8. The membrane is wetted at multiple positions along the cleaning path, both in the wash basins 9, 14, and under spray nozzles 11, 12. As the film-supported membrane 6 issues from membrane drawing machine 7, the membrane 6 is transferred at drawing speed over guide rollers 5 and support roller 18. In this configuration, the upper side of membrane 6 is brushed by the rotating wiping roller 3 (here, configured as a brush) in the presence of washing liquid from nozzles 11 to loosen and remove most of the filter dust impurities.

Dependent Claim 2: Claim 2 depends from claim 1, adding the limitation that "the removal of impurities is continued as long as unevaporated solvent remains in the membrane." *See, e.g., id.* at 4:3-5 (wiping prior to drying of membrane is complete); *id.* at 9:19-10:18 (membrane rinsed and brushed before remaining solvent is removed in membrane dryer 8)).

Dependent Claim 15: Claim 15 depends from claim 1, adding the limitation that "the membrane is composed of at least one cellulosic material selected from the group consisting of cellulose nitrate and cellulose acetate." *Id.* at 4:6-8 (identification of the recited materials).

Dependent Claims 16-17: Claim 16 depends from claim 1 and claim 17 depends from claim 16, adding the pore size limitations that "the membrane exhibits a pore width of from 0.01 to 12 μm" and the "membrane exhibits a pore width of greater than 0.45 μm." *Id.* at 6:31-34 (identification of the recited pore parameters).

(vi) Grounds of Rejection to Be Reviewed on Appeal

The following rejections are currently pending:

- Claims 1-2 and 15-17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,628,960 to Beer, *et al.* ("Beer '960").
- Claims 1-2 and 15-17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Beer '960 in view of U.S. Patent No. 5,826,129 to Hasebe, *et al.* ("Hasebe").

(vii) Argument

1. **The Pending Rejections of Claims 1-2 and 15-17**. With respect to the first ground of rejection of the pending claims as obvious in view of the Beer '960 reference, the pending June 27, 2008 Final Office Action maintains the rejection set forth in the Office Action mailed January 3, 2008, which in turn refers back to a November 10, 2005 rejection based on Dr. Beer's prior '960 patent. In essence, it is the Examiner's position that while the Beer '960 reference is "silent [as] to the claimed steps of brushing and rinsing," it would have been obvious to brush and rinse the surface of a membrane to remove filter dust. November 10, 2005 Office Action at 2-3.

As noted above, in response to this rejection Dr. Beer submitted the Exhibit 1 declaration, setting forth the reasons why exactly the opposite is true – that these delicate membranes were not brushed in the prior art because they were not believed to be able to withstand the physical contact (and hence the prior art focused on highly purifying the feedstocks to eliminate filter dust-generating low molecular constituents *before* forming a membrane). February 10, 2006 Reply, with attached February 2, 2006 Declaration.

In response to Dr. Beer's first declaration, the Examiner summarily dismissed Dr. Beer's evidence regarding the knowledge and expectations of those of skill in the art. Rather than crediting Dr. Beer's 34 years of experience, or even making an attempt to assess whether Dr. Beer's description of the knowledge in the art was accurate, the Examiner instead focused solely on making Dr. Beer prove that the claimed process provided unexpected results. April 28, 2006 Final Office Action at 2-3.

Notwithstanding the Examiner's failure to consider the credibility and accuracy of Dr. Beer's sworn statements of the knowledge and expectations in the art, in order to advance the application, Dr. Beer submitted the Exhibit 2 declaration to provide the Examiner with the requested demonstration of unexpected results.[2]

The Examiner's response once again ignored the "big picture" – his obligation to assess, based on the evidence presented, the non-obviousness of Dr. Beer's radical departure from the prior art pre-purification of feedstock materials to avoid membrane filter dust contamination – and instead focused on alleged issues deep in the details of the test procedure. December 12, 2006 Office Action at 2-3 (*e.g.*, asserting that because the test used mechanical brushing, the claims' limitation of "removing filter dust impurities" should be limited to mechanical brushing). The Office Action also summarily concluded, without

[2] The test results were initially submitted as an attachment to the Appellant's July 26, 2006 Request for Reconsideration of the April 28, 2006 Final Office Action. The test results were subsequently included in Dr. Beer's September 11, 2006 Declaration, filed with the Appellant's September 26, 2006 Preliminary Submission after filing of a Request for Continued Examination.

further explanation, that Dr. Beer's second declaration was simply "not deemed convincing." *Id.* at 3

Thus, at no point up through the beginning of 2007 did the Examiner conduct (and importantly, for purposes of appellate review, at no point *document*) any reasoned consideration and determination of whether, in view of the evidence of record, Dr. Beer's new, substantially less costly membrane production process was unobvious over the prior art purify-first approach to filter dust avoidance.

This narrow focus on testing procedures and results supporting the Examiner's preoccupation with unexpected results, rather than focusing on the non-obviousness of the invention *as a whole*, continued through the remainder of the prosecution of this application up to the present appeal. In the May 30, 2007 Final Office Action, the Examiner simply referred to the prior § 103(a) rejection based on the Beer '960 reference, repeated his prior remarks suggesting that the declaration only supported a claim scope limited to the actual test (*i.e.*, claims limited to mechanical brushing), and added new remarks questioning – without any substantial basis – whether one or ordinary skill would have understood the terms used by the inventor,[3] and whether the wetting agent used during the filter dust removal step was adequately disclosed in the original specification.[4] May 30, 2007 Final Office Action at 2-3.

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[3] The objected-to terms "casting dope" and "phase inversion" being notoriously well known in the art, as even a cursory review of the prior art identified by the Examiner reveals. The Appellant also submitted examples of the use of these terms in the art.

[4] The wetting agent, sodium alkyl sulfonate, is one of a number of very well known surfactants. In subsequent responses, the Appellant provided extensive supporting documentation demonstrating that those of ordinary skill recognize this to be one of many such wetting agents of the type identified in the original Specification.

In this same Final Office Action, the Examiner for the first time added the current second ground of rejection, attempting late in the prosecution to support the rejections by adding a reference alleged to suggest the present invention's mechanical brushing. *Id.* at 2. This rejection further demonstrates the Examiner's refusal to consider the invention *as a whole*, instead focusing on the act of mechanical brushing without *any* consideration of context.

Incredibly, the Examiner cited the Hasebe reference – a reference teaching the rinsing after brushing of *rock-hard silicon substrates* – as suggesting that one of ordinary skill would have found it obvious to apply Hasebe's brush and rinsing to the extraordinarily *delicate*, partially-dried membranes. The Appellant submits that the Examiner could hardly have provided a better illustration of his refusal to consider the invention as a whole and the *actual* teachings of the prior art, as there is no reason to *begin* to think one of ordinary skill would even consider applying a silicon crystal cleaning technology to delicate partially-formed membranes.

The prosecution of the present application has concluded with:

- the Appellant's October 30, 2007 attempt to get the Examiner to focus on the present invention as a whole,
- the Examiner's January 3, 2008 continued focus on the details of the testing conducted by Dr. Beer in response to the Examiner's request for unexpected results evidence (*e.g.*, further discussion as to whether sodium alkyl sulfonate would be recognized as one of the disclosed "anionic wetting agents"; January 3, 2008 Office Action at 3),
- the Appellant's March 28, 2008 Response providing 40 pages of exemplary materials demonstrating that those of skill in the art *readily* understand that sodium alkyl sulfonate is one of the disclosed class of anionic wetting agents, (Response Annex I, II) and that "phase inversion" is well-known phenomena used for forming structures such as these membranes

(Response Annex III, providing a textbook-based "how-it-works" description for forming synthetic polymeric membranes), and

- the Examiner's June 27, 2008 Final Office Action, a virtual carbon-copy restatement of his previous rejections.

2. The Examiner Has Consistently Refused to Consider the Invention as a Whole, and Has Failed to Establish a *Prima Facie* Case of Obviousness.

As a fundamental matter of examination, determination of the obviousness or non-obviousness of a claimed invention requires the Examiner to consider the claimed invention *as a whole*:

> In determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103(a) is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious.

MPEP § 2141.02 I (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983) (emphasis in original)).

The "invention as a whole" in this case is the fundamental reversal of the prior art approach to membrane formation – the expensive pre-purification of feedstock materials which was universally relied upon *precisely because it was known and accepted in the art that still-wet membranes could not be reliably brushed and rinsed without the potential for substantial membrane damage. See, e.g.*, Exhibit 1, Dr. Beer's February 2, 2006 Declaration, ¶ 9.[5]

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[5] This *unrebutted* record evidence states: "First, one of skill in the art would know that *the nature and order of steps in the prior art has been dictated by* the product obtainable by the prior art technology, not as a result of mere choice of the order of interchangeable process steps. *One of the primary reasons for using a feedstock purification process is that it is not possible to completely remove filter dust from a fully dried membrane using a conventional process such as brushing.* In effect, the deficiencies of the post membrane formation cleaning technologies *force manufacturers to make their feedstocks as pure as reasonably possible to minimize the dust load on the finished membrane.* One of skill would know that while attempts have been made to remove dust after membrane formation by physical action (e.g., brushing), complete removal of dust has been difficult

Contrary to the Examiner's view, the question is not whether it would have been obvious to brush a membrane after it was formed (a predicate to justifying his attempts to merely identify well-known uses of brushing to remove particles from surfaces to find the claimed invention obvious), the question is whether, *considering the invention as a whole* – in other words, *considering the nature of the substrate on which the filter dust accumulates* – whether one of ordinary skill in the art would have considered it obvious to apply a brushing and/or rinsing technique *to this particular substrate*.

Viewed in the proper context as required, there is uncontested record evidence from one of the most experienced and skilled members of the art (Dr. Beer) that those of ordinary skill in the art relied on pre-purification of feedstock materials *precisely because* post-membrane brushing and rinsing was not believed viable – exactly the *opposite* of what the Examiner so blithely deems, in hindsight, to be obvious. The Examiner's failure to consider the extremely delicate nature of the membrane substrate in the present invention is all the more evident in his citation to the Hasebe reference as teaching brushing and rinsing of a surface, where the Hasebe surface is a remarkably robust silicon crystal structure.

Because the Examiner has failed to consider the claimed invention as a whole is assessing the patentability of claims 1-2 and 15-17 under § 103(a) (and further, at a minimum, has failed to document a sustainable reasoning

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to achieve, and physical processes applied to dry membranes result in very undesirable damage to the membrane surface, in particular leaving irregular grooves in the membrane surface." Exhibit 1, ¶ 9 (emphasis added).

supporting for the pending rejections suitable for appellate review), the Appellant respectfully submits that the Examiner has failed to establish a *prima facie* case of obviousness under § 103(a). Accordingly, on this basis alone, the pending rejections should be reversed.[6]

3. **The Claimed Invention is Patentable Over the Cited References.**

In addition to failing to establish a *prima facie* case of obviousness by failing to consider the presently claimed invention as a whole, the Examiner has also failed to establish, *prima facie*, that the cited references render the present invention unpatentable under § 103(a).

MPEP § 2143 states that "[t]he initial burden is on the examiner to provide some suggestion of the desirability of doing what the inventor has done," and then cites *Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985) for the long-standing proposition that:

> "To support the conclusion that the claimed invention is directed to obvious subject matter, either *the references* must expressly or impliedly suggest the claimed invention or the examiner *must present a convincing line of reasoning as to why* the artisan would have found the claimed invention to have been obvious *in light of the teachings of the references.*"

MPEP § 2143 (emphasis added). In the present case, the references do not teach *anything* regarding the claimed approach to producing an improved membrane with substantially reduce filter dust, and further the Examiner has not provided

[6] As a related matter, while the Appellant recognizes that the results of examination in corresponding foreign cases are not binding in a U.S. case, the Appellant notes in support of the position that the claimed process *as a whole* is a new, unobvious departure from the prior art, that broader versions of the U.S. claims were allowed in the corresponding German application, and further these claims were maintained in essentially unamended form in a subsequent opposition proceeding.

a substantial line of reasoning (let alone a *convincing* line) for either combining the Beer '960 and Hasebe references or finding the invention obvious in view of Beer '960 by itself.

Turning to the specific bases for rejection identified in the June 27, 2008 Final Office Action (which in turn refers to the rejections in the January 3, 2008 Office Action), the Appellant notes that the Beer '960 reference contains nothing which teaches or suggests the Appellant's novel approach of conducting the cleaning step while the newly-formed membrane is still at least partially wet (per claim 1, "prior to drying"). In other words, Beer '960 not only fails to teach the recited mechanical brushing while rinsing, it also fails to teach or suggest anything regarding the fundamental reversal of the prior art approach to membrane formation, let alone *the specific stage* at which the filter dust removal step is to be carried out (*i.e.*, after membrane formation, but before the membrane is dry). The Examiner provides no convincing reasoning as to how or why it would have been obvious for one of ordinary skill to think of applying brushing and/or rinsing to a delicate membrane no one previously believed capable of surviving such physical pressures.

As to the Hasebe reference, the Applicants respectfully submit that this silicon crystal cleaning reference is non-analogous art, and in any event one of ordinary skill in the art would not have a considered using Hasebe's high pressure water jet cleaning process (a process required to be harsh enough to clean hard, rigid semiconductor wafer surfaces) for removing "dust" from these extraordinarily delicate membranes.

Accordingly, because there is no teaching or suggestion, either in the references themselves or elsewhere, for the Examiner's asserted modification of these references to obtain the claimed invention, a *prima facie* case of obviousness has not been established. This is a further ground requiring reversal of the pending § 103(a) rejections.

4. **The Claims Are Not Obvious Under *KSR*.**

Finally, the Appellant submits that reversal of the pending rejections is required in view of both the Supreme Court's *KSR* decision and the latest training provided to the Examiners in the wake of *KSR*.

First, under MPEP § 2143, the Examiner is required to meet the Office's stated standards for evaluating obviousness under § 103(a), and to do so with sufficient specificity to permit appellate review:

> Office policy is to follow *Graham v. John Deere Co.* in the consideration and determination of obviousness under 35 U.S.C. 103. ... [T]he four factual inquires enunciated therein as a background for determining obviousness are as follows:
>
> (A) Determining the scope and contents of the prior art;
> (B) Ascertaining the differences between the prior art and the claims in issue;
> (C) Resolving the level of ordinary skill in the pertinent art; and
> (D) Evaluating evidence of secondary considerations.

MPEP § 2141. This requirement remains applicable after *KSR*, as emphasized in the May 3, 2007 Memorandum from the Deputy Commissioner for Patent Operations, which noted the Supreme Court's reaffirmance of the applicability of requirement to analyze questions of obviousness in accordance with the *Graham* decision, and as further emphasized in the recently-issued Examiner training materials:

> "The factual inquiries in Graham are still the basis for determining obviousness under 35 U.S.C. 8103 [sic, § 103]. ... In view of the guidance provided by the Supreme Court in KSR, *an examiner must continue to articulate a reason or rationale to support an obviousness rejection* under 35 U.S.C. § 103(a)."

May 3, 2007 Deputy Commissioner for Patent Operations Memorandum at 1 (emphasis added).

The Appellants respectfully submit that the mere assertion that applying a brushing technique to these delicate membranes would have been obvious, particularly in the face of unconverted record evidence from Dr. Beer to the contrary, and the absence of any cited reference teaching toward the present invention's fundamental reversal of the prior art membrane formation process, does not satisfy the requirements of § 103(a), let alone the Office's own requirements for a substantial justification of a rejection.

Turning to the Supreme Court's recent guidance in *KSR*, applying the traditional teaching, suggestion or motivation test does not support the Examiner's allegation of obviousness. As noted above, there simply is no teaching or suggestion in any of the cited references of the present invention's application of brushing or rinsing to the prior art membranes in the manner recited in the pending claims. To the contrary, the record evidence shows that there was no expectation that the application of brushing or rinsing would result in anything but unacceptably damaged membranes. Thus, there cannot reasonably be a finding "that one of ordinary skill in the art would have recognized that the results of the combination were predictable."

In addition, in view of the same record evidence, it cannot reasonably be maintained that the present invention is the result of an obvious "[u]se of known

technique to improve similar devices in the same way" or of "[a]pplying a known technique to a known device ready for improvement to provide predictable results." The Examiner has not (and cannot) established that there has been an improvement of a similar counterpart to the subject membrane formation process which has been improved in a similar way, nor has the Examiner provided any substantive rebuttal to the Appellants' evidence that those of ordinary skill in the art did not believe post-formation brushing or rinsing to remove filter dust was a viable process which would provide "predictable" and satisfactory results.

As to the last factor discussed in the Examination Guidelines, it cannot reasonably be argued in view of the present record – which includes no suggestion of brushing or rinsing of the subject delicate membranes – that it would have been "obvious to try" the claimed approach to filter dust removal.

In sum, the Appellant respectfully submits that the Examiner's mere assertion that it would have been obvious to use brushing or rinsing after formation of a prior art membrane, without consideration of the invention as a whole, is both inconsistent with the record evidence and ultimately unsupportable. Thus, present rejection appears to fall directly within the scope of the observations of the Board of Appeals in recent Appeal 2007-4230:

> In making the assertions set forth in the Answer, the Examiner has seemingly taken at least some of the applied references' disclosures out of context without providing persuasive reasoning to support the contention that the combination of [the cited chemical methods] would have led one of ordinary skill in the art to the here claimed subject matter.
>
> *In other words, the Examiner's rationale for the rejection falls short of identifying "a reason that would have prompted a person of ordinary skill in the art to combine the elements" in the manner claimed. KSR Int'l Co. v. Teleflex, Inc.*, 127 S.Ct. 1727, 1731, 82

USPQ2d 1385, 1389 (2007).

(emphasis added).

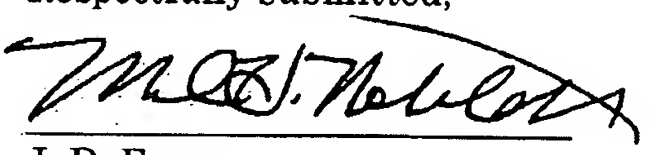
CONCLUSION

In the absence of consideration of the invention as a whole, and the lack substantial evidence supporting any rationale providing "a reason that would have prompted" a person of ordinary skill in the art to modify the cited references in the manner asserted by the Examiner, the Appellant respectfully submits that a *prima facie* case of obviousness has not been established under § 103(a) or the guidance provided by the Supreme Court in the *KSR* decision. Accordingly, reversal of the pending § 103(a) rejections is respectfully requested.

The Appeal Brief is being submitted with the required fee of $540.00. This amount is believed to be correct, however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 05-1323, Docket No.: 103655.50685US.

Respectfully submitted,

December 9, 2008



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Claims Appendix

The claims on appeal read as follows:

1. (previously presented) A process for producing a no-through-flow diagnostic cellulose membrane having a refined surface, comprising the steps of:

(a) preparing a feedstock membrane from a cellulose membrane casting solution by phase inversion in an evaporation process, and

(b) prior to drying the resulting feedstock membrane, removing filter dust impurities by mechanical brushing while rinsing with water from at least one side of said partially-dried feedstock membrane from which the solvent is evaporated in the evaporation process of step (a).

2. (original) A process according to claim 1, wherein the removal of impurities is continued as long as unevaporated solvent remains in the membrane.

3-14. (canceled)

15. (original) A process according to claim 1, wherein the membrane is composed of at least one cellulosic material selected from the group consisting of cellulose nitrate and cellulose acetate.

16. (original) A process according to claim 1, wherein the membrane exhibits a pore width of from 0.01 to 12 μm.

17. (original) A process according to claim 16, wherein membrane exhibits a pore width of greater than 0.45 μm.

18. (withdrawn) A surface-refined membrane composed of cellulose, produced by a process comprising the steps of:

(a) preparing a feedstock membrane from a membrane casting solution by phase inversion in an evaporation process, and

(b) prior to drying the resulting feedstock membrane, removing impurities from at least one side of the feedstock membrane from which solvent has been evaporated in the evaporation process of step (a).

19. (withdrawn) A surface-refined membrane according to claim 18, wherein the removal of impurities is continued until the membrane is free of unevaporated solvent.

20. (withdrawn) A surface-refined membrane according to claim 18, wherein step (b) comprises bringing the side of the membrane from which impurities are to be removed, into contact with at least one cleansing agent or cleansing device.

21. (withdrawn) A surface-refined membrane according to claim 20, wherein the impurities are removed by a cleansing fluid.

22. (withdrawn) A surface-refined membrane according to claim 21, wherein the cleansing fluid is a gas.

23. (withdrawn) A surface-refined membrane according to claim 22, wherein the impurities are removed by a pressurized gas stream.

24. (withdrawn) A surface-refined membrane according to claim 22, said gas is air.

25. (withdrawn) A surface-refined membrane according to claim 21, wherein the cleansing fluid is a liquid.

26. (withdrawn) A surface-refined membrane according to claim 25, wherein the impurities are removed by a pressurized liquid stream.

27. (withdrawn) A surface-refined membrane according to claim 20, wherein the membrane is contacted with at least one cleansing device selected from the group consisting of wipers and suction devices.

28. (withdrawn) A surface-refined membrane according to claim 18, wherein, in step (b), the membrane passes through:

(i) a first rinsing device;

(ii) a second rinsing device; and

(iii) at least one wiper.

29. (withdrawn) A surface-refined membrane according to claim 28, wherein membrane in the second rinsing device is contacted with at least one additive.

30. (withdrawn) A surface-refined membrane according to claim 29, wherein said at least one additive is a wetting agent.

31. (withdrawn) A surface-refined membrane according to claim 25, wherein the cleansing agent comprises at least one liquid selected from the group consisting of water and alcohols containing from 1 to 6 carbon atoms.

32. (withdrawn) A surface-refined membrane according to claim 18, wherein the membrane is composed of at least one cellulosic material selected from the group consisting of cellulose nitrate and cellulose acetate.

33. (withdrawn) A surface-refined membrane according to claim 18, wherein the membrane exhibits pore widths from 0.01 to 12 μm.

34. (withdrawn) A surface-refined membrane according to claim 33, wherein the membrane exhibits a pore width of greater than 0.45 μm.

35. (withdrawn) An apparatus for refining a surface of a membrane composed of cellulose produced by phase inversion in an evaporation process, said apparatus comprising:

- at least one membrane drawing machine for producing a feedstock membrane by phase inversion in an evaporation process;

- at least one membrane cleansing device for bringing at least one side of the feedstock membrane from which impurities are to be removed, into contact with at least one cleansing agent or cleansing device, and

- at least one membrane dryer;

wherein said membrane cleansing device is arranged between the membrane drawing machine and the membrane dryer.

36. (withdrawn) An apparatus according to claim 35, wherein the membrane cleansing device comprises at least one rinsing device for rinsing the side of the feedstock membrane from which impurities are to be removed, with a cleansing liquid comprising at least one cleansing agent.

37. (withdrawn) An apparatus according to claim 36, wherein a first rinsing device is arranged immediately downstream of the membrane drawing machine and a second rinsing device is arranged immediately upstream of the membrane dryer.

38. (withdrawn) An apparatus according to claim 37, wherein said first rinsing device comprises at least one nozzle for spraying a washing liquid on the side of the membrane from which impurities are to be removed.

39. (withdrawn) An apparatus according to claim 37, wherein said first and second rinsing devices each comprise a washing basin for holding a cleansing liquid, and guide rollers for transporting the membrane through the respective washing basins.

40. (withdrawn) An apparatus according to claim 39, wherein the washing basin of the second rinsing device contains a washing liquid, which, in turn, contains at least one additive.

41. (withdrawn) An apparatus according to claim 40, wherein the additive is a wetting agent.

42. (withdrawn) An apparatus according to claim 35, wherein the membrane cleansing device comprises at least one wiper or suction device.

43. (withdrawn) An apparatus according to claim 42, wherein each wiper comprises a wiper element having a width at least equal to the membrane and arranged on a resilient element so that when the membrane is moved relative to

the wiper, the wiper element will sweep over the side of the membrane from which impurities are to be removed.

44. (withdrawn) An apparatus according to claim 42, wherein the membrane cleansing device comprises a wiper roller with wiper elements arranged on an outer surface thereof, said wiper roller rotating in the direction in which the membrane is drawn, and at a speed greater than the speed at which the membrane is drawn.

45. (withdrawn) An apparatus according to claim 44, wherein membrane cleansing device further comprises a support roller which rotates in the direction in which the membrane is drawn and at the speed at which the membrane is drawn, said support roller being arranged to form a nip with the wiper roller through which the membrane is guided.

46. (withdrawn) An apparatus according to claim 43, wherein each wiper element comprises a rubber wiper or a brush.

47. (withdrawn) An apparatus according to claim 36, wherein said rinsing device comprises a wash basin containing a cleansing liquid and at least one wiping element arranged above the wash basin to wipe cleansing liquid from the membrane emerging from the wash basin.

48. (withdrawn) An apparatus according to claim 43, wherein said wiper elements are provided with nozzles for spraying a rinsing liquid onto the wiper elements.

49. (withdrawn) A method of diagnostic testing for an analyte in a liquid test sample where the presence or absence of said analyte is indicative of a disease state, said method comprising contacting said test sample with a test strip containing a reagent which interacts with said analyte in a detectible manner, wherein said test strip comprises a membrane according to claim 18.

50. (cancelled)

Evidence Appendix

Exhibit 1, Declaration of Dr. Hans Beer dated February 2, 2006, is attached hereto.

Exhibit 2, Declaration of Dr. Hans Beer dated September 11, 2006, is attached hereto.

EXHIBIT 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	: 10/051,459	Confirmation No.	: 6980
Applicant	: Hans BEER, et al.		
Filed	: January 22, 2002		
TC/A.U.	: 1743		
Examiner	: L ALEXANDER		
Docket No.	: 010743.50685US (formerly 2265.50685)		
Customer No.	: 23911		
Title	: SURFACE-ENHANCED MEMBRANE AND PROCESS AND APPARATUS FOR PRODUCING SAME		

DECLARATION UNDER 37 CFR §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Dr. Hans Beer, declare that:

1. I am a resident and citizen of Germany. I am the inventor of the invention described in the above-referenced application.

2. I have a doctor's degree of natural science and 34 years experience in the field of membrane technology. My current job title at Sartorious AG is Senior Scientist in the research & development department of membrane technology.

3. The present invention relates to an improved process for refining the surface of a membrane, and a resulting membrane used to identify specific analytes present in fluid media. In particular, the invention involves removal of impurities (also referred to as "dust") *after* the membrane is formed, but *before* the newly-formed membrane dries, by contacting the still-wet membrane with a cleaning agent and/or a cleaning device.

4. In the prior art, dust particles formed on membrane structures were minimized, but not eliminated, by measures such as filtration and/or precipitation of impurities from the feedstock liquids prior to the use of the feedstocks in a membrane formation process. These purification processes have proven to be less than completely successful, as the resulting membranes frequently still exhibited dust contamination, with the impurities interfering with the membranes' ability to provide crisp, well-defined target analyte indications. Moreover, the precipitation/purification processes add significant additional expense to the membrane production process.

5. The Beer, *et al.*, reference (U.S. Patent No. 5,628,960) cited in the U.S. Office Action of November 11, 2005 is an example of this prior art. In Beers, the cellulose derivatives to be used with the polymeric blend solution are re-precipitated prior to the addition of the polymeric blend solution and prior to the formation of a membrane. Beer does not suggest to one of skill in the art to remove impurities *after* formation of the membrane in the manner of the present invention, but before all the solvent as been evaporated.

6. In the U.S. Office Action of November 11, 2005, the Examiner states that the removal of contaminants prior to drying a feedstock would have had the same expected result (as Beer) in removing a contaminant, and thus the order of contaminant removal steps is a "result effective variable" and it would have been within the skill in the art to modify Beer to remove dust from a partially dried membrane "as optimization of a result effective variable."

7. Based on my knowledge and years of experience in this field, I can state this new process and resulting product are not mere "optimization" of a variable, but a completely new approach to membrane production that was not obvious to those of skill in the art.

8. With regard to the order of the process steps, it is not correct that removing contaminants prior to drying vs. after drying results in the same product.

9. First, one of skill in the art would know that the nature and order of steps in the prior art has been dictated by the product obtainable by the prior art technology, not as a result of mere choice of the order of interchangeable process steps. One of the primary reasons for using a feedstock purification process is that it is not possible to completely remove filter dust from a fully dried membrane using a conventional process such as brushing. In effect, the deficiencies of the post-membrane formation cleaning technologies force manufacturers to make their feedstocks as pure as reasonably possible to minimize the dust load on the finished membrane. One of skill would know that while attempts have been made to remove dust after membrane formation by physical action (*e.g.*, brushing), complete removal of dust has been difficult to achieve, and physical processes applied to dry membranes result in very undesirable damage to the membrane surface, in particular leaving irregular grooves in the membrane surface. These grooves degrade the membranes' ability to provide definitive analyte results, as the non-uniform or homogeneous surface

results in a turbulent front of a migrating analyte fluid, and asymmetry in migration which and render the sample results indistinct. Thus, the prior art steps were dictated by the need to minimize dust formation on the final dried product (and even then, the best the prior art could achieve with its processes was a contaminated membrane, unlike the essentially dust-free membrane obtained with the present invention).

10. Next, having worked in this field for many years, I am aware that the common expectation of those skilled in the art (even those with knowledge of the Beer and Johnson, *et al.* (U.S. Patent No. 4,894,157) references) would be that there is no way dust could be removed from a *partially-dried*, crude membrane *without destroying the membrane*. Thus, the development of the present inventive process and a resulting dust-free membrane by removing dust before the solvent is evaporated was a radical shift away from the common expectation in the art, and not a mere re-ordering of interchangeable process steps.

11. My view of the knowledge in the art is consistent with the fact that no one had previously pursued the present invention's approach. The significant additional expense associated with prior art feedstock purification methods, and the strong desire for a much cleaner membrane product to provide a more useful analytical tool, provided those of skill in the art with a great motivation to find and implement an improved membrane production process. If the present invention was nothing more than an obvious rearrangement of process steps,

these cost savings and improved product would have appeared in the market long ago.

12. In contrast to the prior art, the present invention results in a lower cost, highly clean membrane with properties that one of skill in the art would recognize could not have been obtained by merely rearranging the Beer and/or Johnson steps, *i.e.*, a membrane with a highly uniform test fluid migration (phenol red solution) of 90 seconds/40 mm, with a precise and intensive colored dividing line, due in large part to the lack of membrane damage from dry-membrane brushing and the lack contaminants which still exist even after a Beer feedstock purification process.

I declare that the preceding statements which are made from my own knowledge are true and that the preceding statements which are made on information and belief are believed to be true.

I am aware that willful false statements and the like are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and may jeopardize the validity of the application or any patent issuing thereon.

February 02, 2006
DATE

Dr. Hans Beer
SIGNATURE

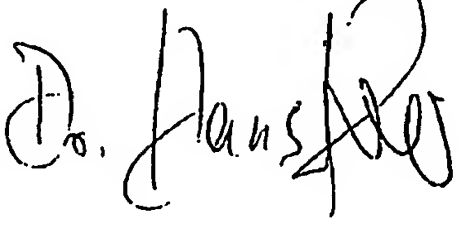

EXHIBIT 2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10/051,459	Confirmation No. : 6980
Applicant	:	Hans BEER, et al.	
Filed	:	January 22, 2002	
TC/A.U.	:	1743	
Examiner	:	L ALEXANDER	
Docket No.	:	010743.50685US (formerly 2265.50685)	
Customer No.	:	23911	
Title	:	**SURFACE-ENHANCED MEMBRANE AND PROCESS AND APPARATUS FOR PRODUCING SAME**	

DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Dr. Hans Beer, declare that:

1. I am a resident and citizen of Germany. I am the inventor of the invention described in the above-referenced application.

2. I have a doctor's degree of natural science and 34 years of experience in the field of membrane technology. My current job title at Sartorious AG is Senior Scientist in the research & development department of membrane technology.

3. In my Declaration dated February 2, 2006, I described (i) the present invention, an improved process for refining the surface of a membrane, and a resulting membrane used to identify specific analytes present in fluid media (the invention involving removal of impurities *after* the membrane is formed, but *before* the newly-formed membrane dries, by contacting the still-wet membrane

with a cleaning agent and/or a cleaning device), (ii) the prior art problems with filter dust particles formed on membrane structures even with measures such as filtration and/or precipitation of impurities from the filter feedstock liquids, (iii) the lack of suggestion in the prior art for removal of impurities *after* formation of the membrane, but before all the solvent as been evaporated, and (iv) why the removal of contaminants prior to drying a feedstock was not merely the result of "optimization of a result effective variable."

4. I am aware that in the U.S. Office Action mailed April 28, 2006, the Examiner indicated that the provision of further information showing actual data reflecting the unexpected results of the present invention may be sufficient to demonstrate the results are not a matter of optimization. The following information documents the testing conducted to provide the desired demonstration.

5. The attached table, Attachment 1, identifies the testing procedure used to prepare the filter membrane samples shown in the enclosed test result photographs, Fig. 1 (prior art) and Fig. 2 (present invention). As shown in the table, the membrane preparation process started with refinement of the cellulose nitrate raw feedstock material for the membrane prepared with the prior art U.S. Patent No. 5,628,960 process (the Fig. 1 membrane). Importantly, as shown in the table, the feedstock material for the present invention membrane (the Fig. 2 membrane) was not refined, consistent with the present invention's ability

to provide unexpectedly good results without the need for the prior art feedstock material refinement.

6. The next membrane preparation step was preparation of the casting dope for each membrane, according to the standard procedures of Sartorius AG, from the refined feedstock material (Fig. 1 membrane) and the unrefined feedstock material (Fig. 2 membrane). As shown in the third row of information in the Attachment 1 table, the casting dope composition of the two membrane samples differed only in the use of refined v. unrefined feedstock materials, otherwise having numerically identical ratios of CN components, methyl acetate, isopropanol, cellulose acetate, sodium alkyl sulfonate and water.

7. The refined and unrefined casting dope samples were then cast in an identical manner by an evaporation process using on a 100 μm polyethylene terephthalate film support, with identical wet film thickness, environmental conditions and belt temperature and speed.

8. In the final steps, consistent with my patent application description and claim 1 of the application (U.S. application Ser. No. 10/051,469), prior to drying the Fig. 2 membrane, filter dust was removed from the upper surface of the Fig. 2 membrane by mechanical treatment with a rotating brush under controlled water rinsing and application of diluted sodium alkyl sulfonate. Both membranes were then finally dried under standard conditions.

9. The filter membrane test strips were subjected to a migration test with a phenol red test liquid. The Fig. 1 membrane, having a pore size of 8 μm had a

migration time of about 130 sec/40 mm, and provided a relatively poor quality (as compared to the present invention) test line, which was diffuse and had a substantially non-uniform dividing line. Such a test line greatly increases the difficulty in exactly determining test substances in actual testing work. The Fig. 2 membrane. also having a pore size of 8 μm, was subjected to the same migration test with a phenol red test liquid, and also demonstrated a migration time of about 130 sec/40 mm. The Fig. 2 photograph shows markedly superior results, despite the lack of pre-casting feedstock refinement, over the prior art Fig. 1 membrane, with the test line demonstrating a significantly more precise and uniform dividing line.

10. This testing demonstrates the unexpectedly superior results provided by a membrane prepared in accordance with the present invention, which enables exact determination of test substances to a degree not possible with a membrane prepared with prior art refined feedstock membranes.

I declare that the preceding statements which are made from my own knowledge are true and that the preceding statements which are made on information and belief are believed to be true.

I am aware that willful false statements and the like are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States

Code and may jeopardize the validity of the application or any patent issuing thereon.

09-11-06
DATE

Dr. Hans Beer

Description of Membrane Sample Preparation

Preparation step	Membrane sample corresponding to	
	Fig. 1 (U. S. patent no. 5,628,860)	Fig. 2 (U.S.application no. 10/ 051,459)
refinement of cellulose nitrate raw materiels	yes - dissolution of the CN components in methyl acetate, - reprecitation with Isopropanol/ water - filtration - drying	no
preparation of casting dope	- from refined CN raw materials according to our standard operation procedure (including e. g. - sequence of addition - temperature, - stirring time & speed and so on)	- from original, not refined CN raw materials according to our standard operation procedure (including e. g. - sequence of addition - temperature, - stirring time & speed and so on)
casting dope composition	- numerically identical ratios, - consisting of - CN components - methyl acetate - isopropanol - cellulose acetate - sodium alkyl sulfonate - water - identical qualities of all components with exception of cellulose nitrate refined / resp. not refined	
casting process	casting on a 100 µm polyethylene terephthalate film support under defined, identical conditions, concerning e. g.: -wet film thickness - belt temperature and speed - climatic conditions inside the casting channel	

Removal of filter dust	no	yes, by - mechanical treatment of the upside of the membrane with a rotation brush under rinsing with water at defined conditions - reimpregnation with diluted sodium alkyl sulfonate
final drying	with standard production equipment under defined standard conditions	

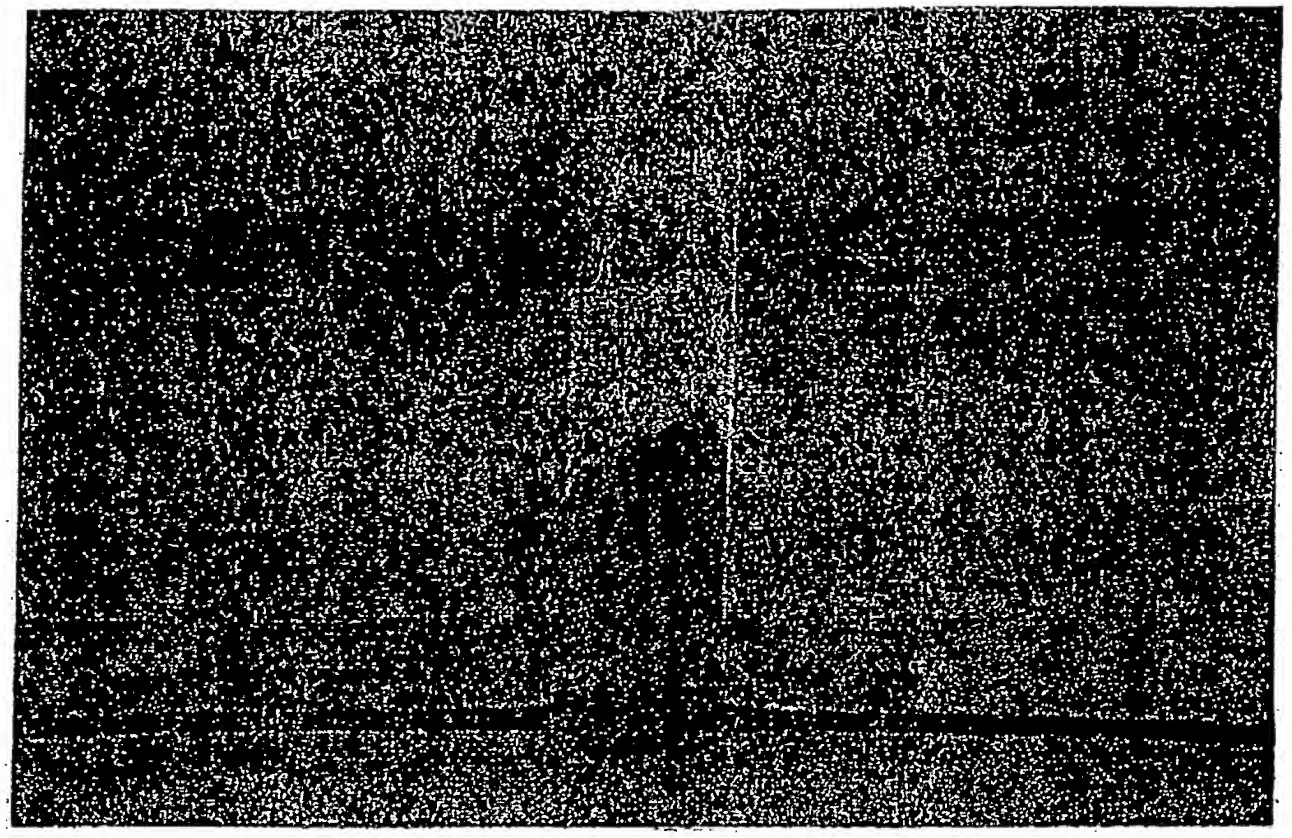

Fig. 1

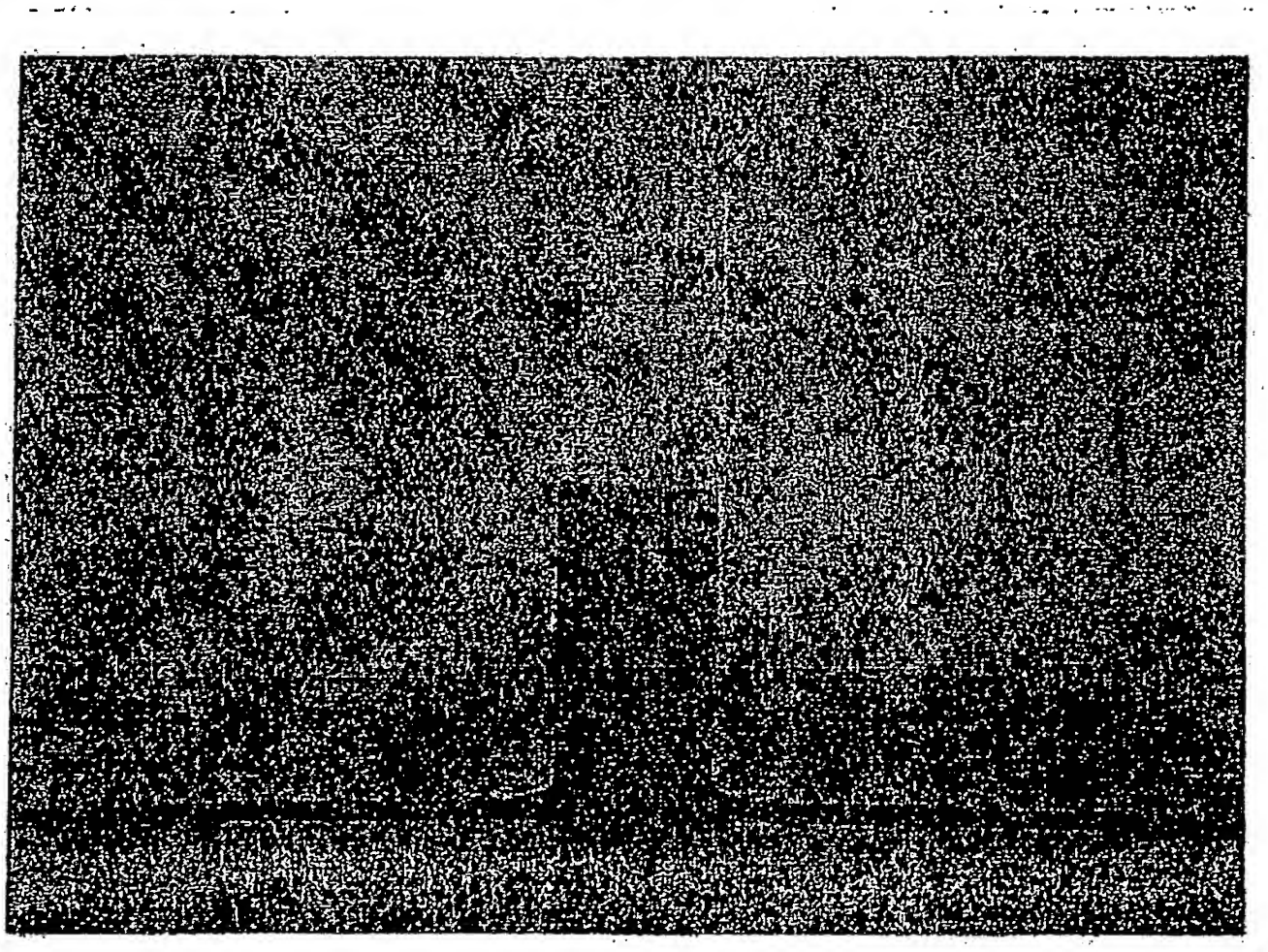

Fig. 2

Related Proceedings Appendix

There are no related proceedings.